Green and Climate resilient healthcare facilities

Centre for Environmental Health, PHFI
Acknowledgements: Health Care Without Harm, SELCO Foundation,

CLIMATE CHANGE

Leads to changing conditions in temperature, rainfall, sea levels
that are responsible for acute climatic events – heatwaves, floods, storms,
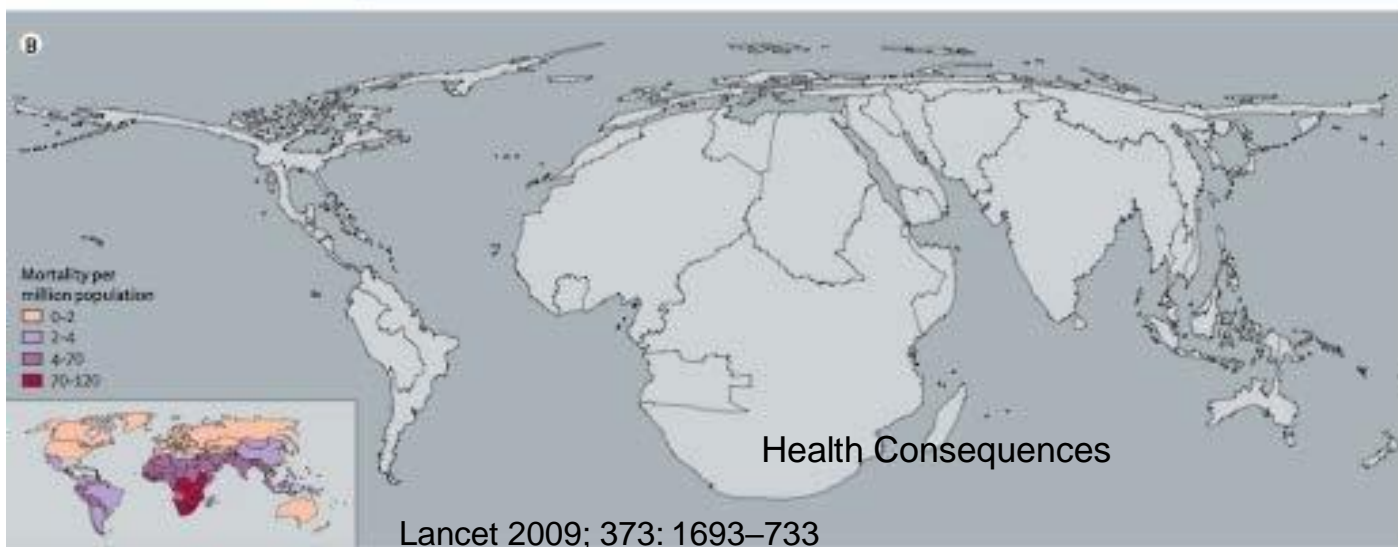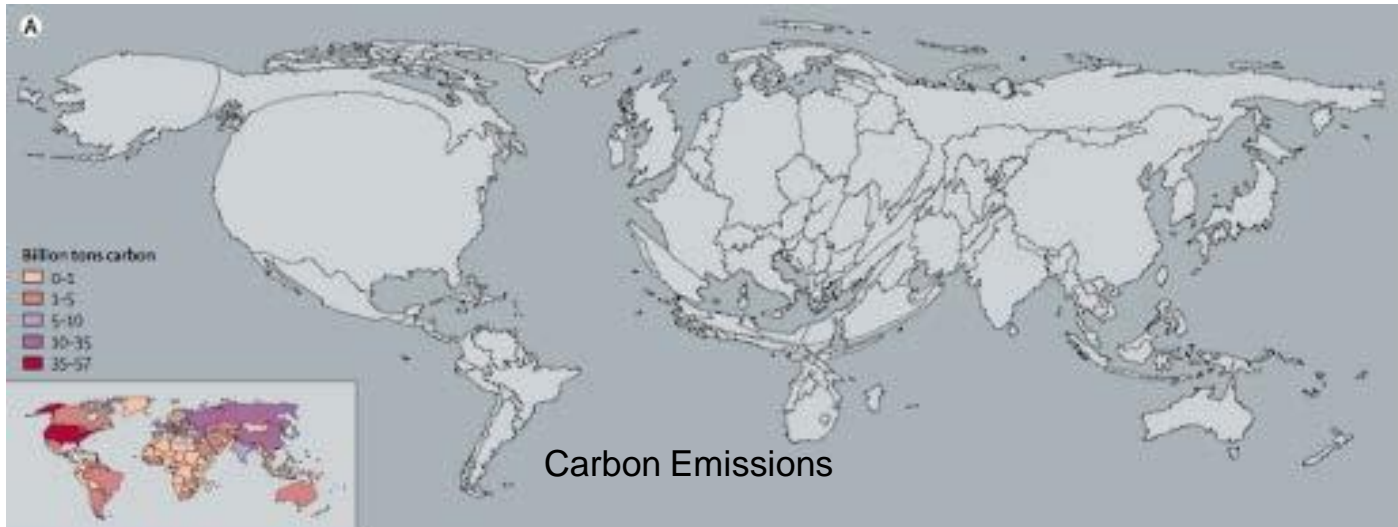cyclones, droughts, poor air quality

Why are we talking about Climate Change?

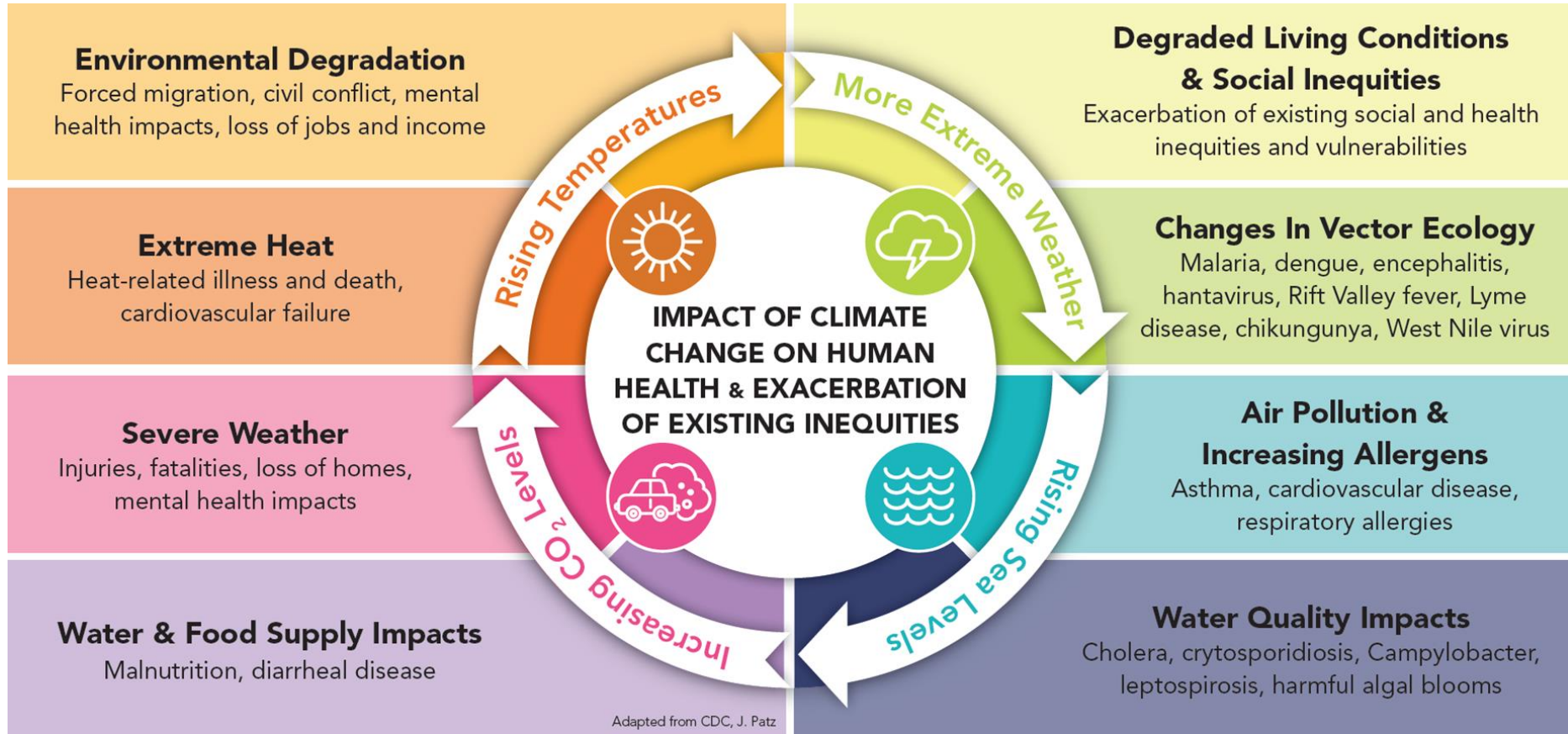- It is the biggest public health ***challenge*** of the 21st century

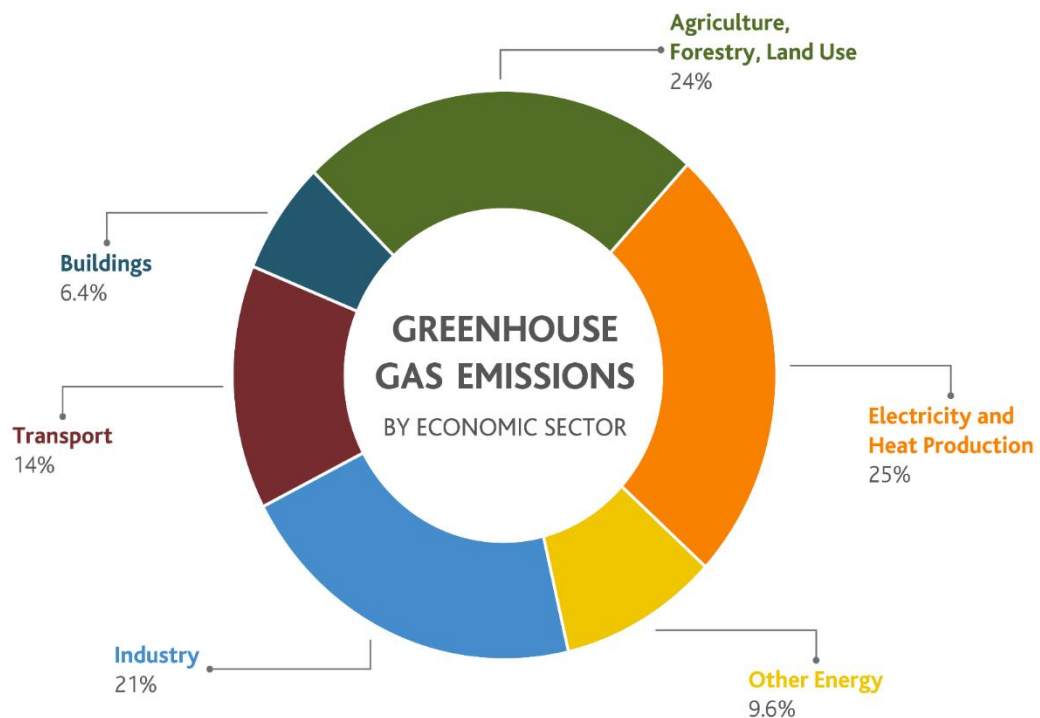- It is the biggest public health ***opportunity*** of the 21st century

Carbon Emissions

Health Consequences

Lancet 2009; 373: 1693–733

Impacts of Climate change on Human Health

Environmental Degradation
Forced migration, civil conflict, mental health impacts, loss of jobs and income

Extreme Heat
Heat-related illness and death, cardiovascular failure

Severe Weather
Injuries, fatalities, loss of homes, mental health impacts

Water & Food Supply Impacts
Malnutrition, diarrheal disease

Degraded Living Conditions & Social Inequities
Exacerbation of existing social and health inequities and vulnerabilities

Changes In Vector Ecology
Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus

Air Pollution & Increasing Allergens
Asthma, cardiovascular disease, respiratory allergies

Water Quality Impacts
Cholera, crytosporidiosis, Campylobacter, leptospirosis, harmful algal blooms

Rising Temperatures

More Extreme Weather

Rising Sea Levels

Increasing CO_2 Levels

IMPACT OF CLIMATE CHANGE ON HUMAN HEALTH & EXACERBATION OF EXISTING INEQUITIES

Adapted from CDC, J. Patz

Sectoral emissions

Agriculture, Forestry, Land Use
24%

Buildings
6.4%

Transport
14%

Industry
21%

GREENHOUSE
GAS EMISSIONS
BY ECONOMIC SECTOR

Electricity and Heat Production
25%

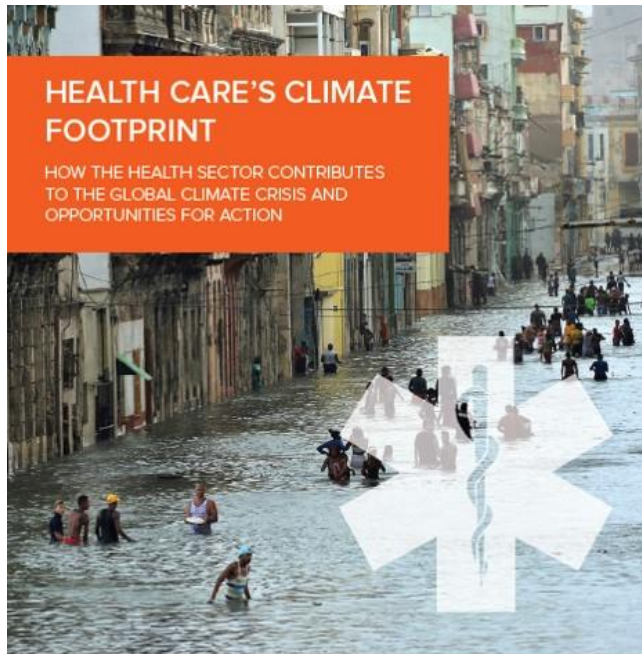**Other Energy**
9.6%

Source: IPCC
©Terravesta Ltd

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Does Health sector have a role?

Do we need to care?

Decarbonize Health Care | The sector makes a major contribution to the climate crisis

Groundbreaking 2019 report

Health care's climate footprint is equivalent to 4.4% of global net emissions.

- Equals emissions from 514 coal fired power plants.

- If health care were a country it would be the fifth largest climate polluter on the planet.

noharm.org/climatefootprintreport

If the global health care sector were a country, it would be the **5th largest emitter on the planet.**

a new report:
HEALTH CARE'S CLIMATE FOOTPRINT

Health Care Without Harm

HEALTH CARE'S CLIMATE FOOTPRINT

HOW THE HEALTH SECTOR CONTRIBUTES
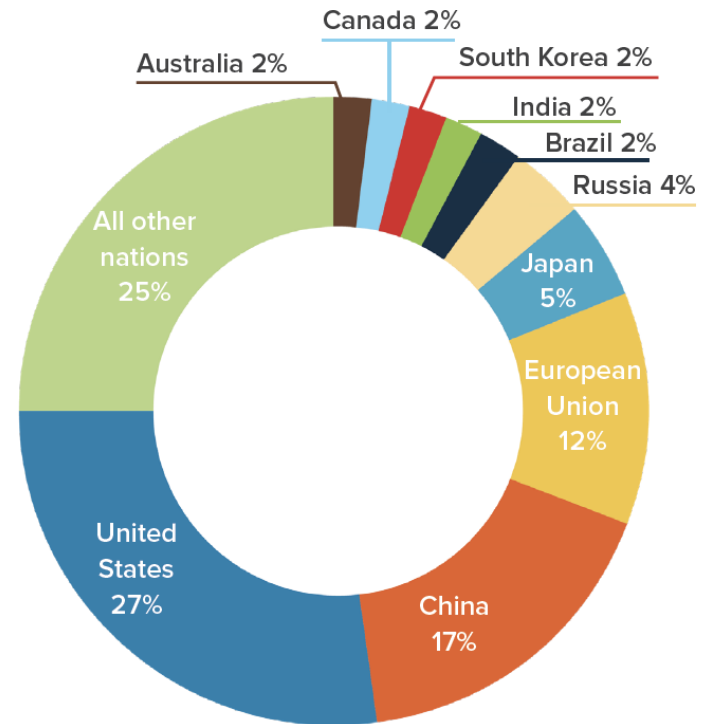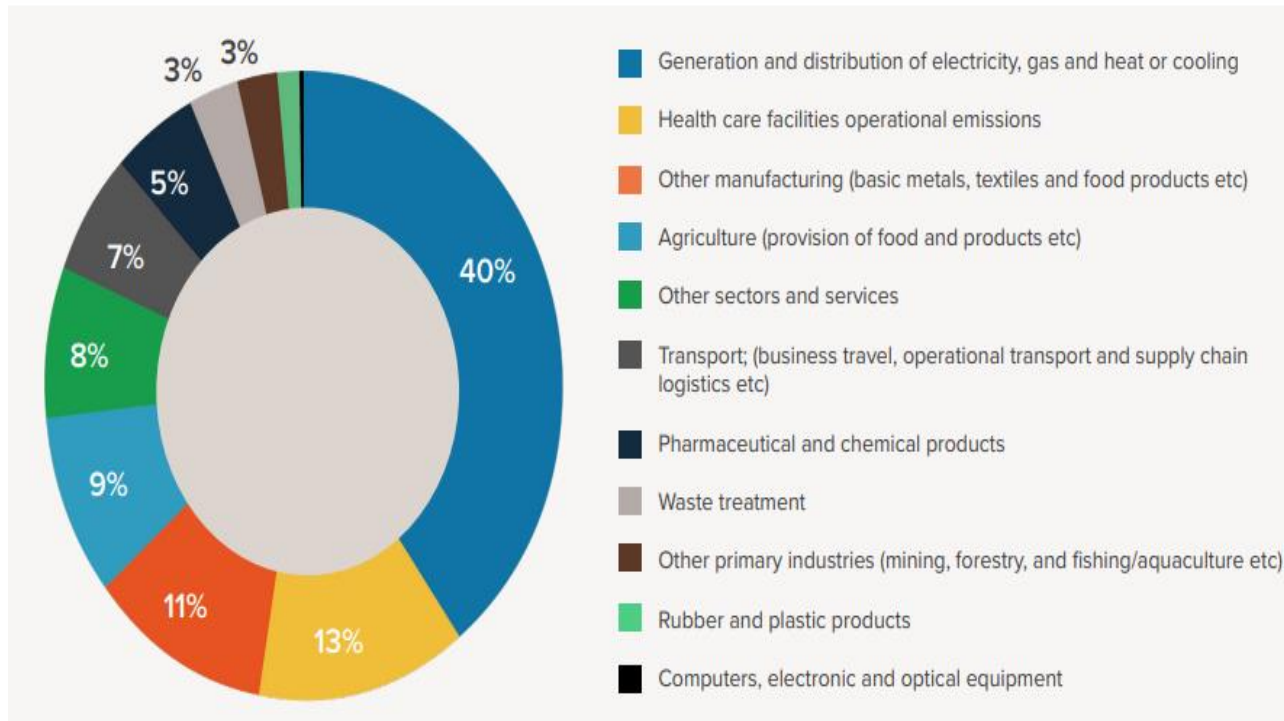TO THE GLOBAL CLIMATE CRISIS AND
OPPORTUNITIES FOR ACTION

Figure 8: Top ten emitters plus all other nations as percentage of global health care footprint.
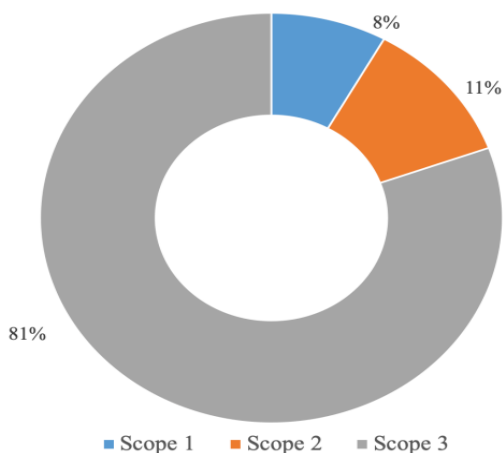
Global Health Care Emissions Split by Production Sector

Indian Healthcare's Climate Footprint

India

- Scope 1 - Scope 2 - Scope 3

SCOPE 1 - Take immediate action to reduce health care facility emissions.

SCOPE 2 - Invest in and advocate for the decarbonization of local and national energy systems and the implementation of clean, renewable energy.

SCOPE 3 - Set and implement criteria for low-carbon or zero-emissions procurement so as to begin to decarbonize the supply chain.

Source: Healthcare's Climate footprint September 2019
https://noharm-global.org/issues/global/health-care%E2%80%99s-climate-footprint

India health care	Value	Unit
Climate footprint	39	$MtCO_2e$
Emissions per capita	0.03	tCO_2e/capita
Emissions as % of national footprint	1.5	%
Expenditure per capita	57	USD
Expenditure as percentage of GDP	3.6	%
% of footprint generated domestically	80.1	%
Health sector footprint equivalence to coal power plant emissions[1]	10	coal-fired power plants in one year
Health sector footprint equivalence to tanker trucks' worth of gasoline[1]	516,286	tanker trucks' worth of gasoline
Health sector footprint equivalence to passenger vehicles driven for one year[1]	8,280,255	passenger vehicles driven for one year

What links climate change and healthcare?

Increasing recognition of impacts of climate change on health
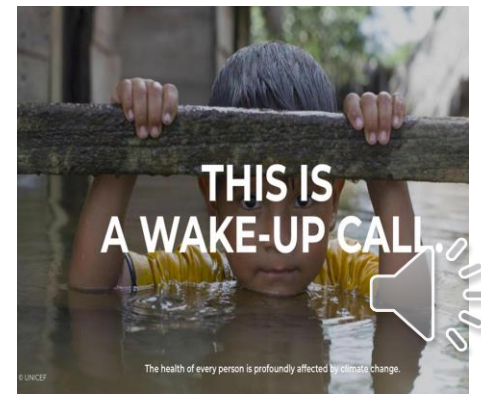
↓

Growing dependence on healthcare services + our own emissions

↓

Requisite capacity(knowledge +infrastructure) to handle the growing burden of diseases, and reduce own carbon footprint

↓

Are we prepared?

THIS IS
A WAKE-UP CALL.

The health of every person is profoundly affected by climate change.

Climate change strikes at the very core of health systems, whose mission is to keep people healthy

Chennai, India floods – December 2015

Hurricane Maria –Puerto Rico 2017

California wildfires   2019
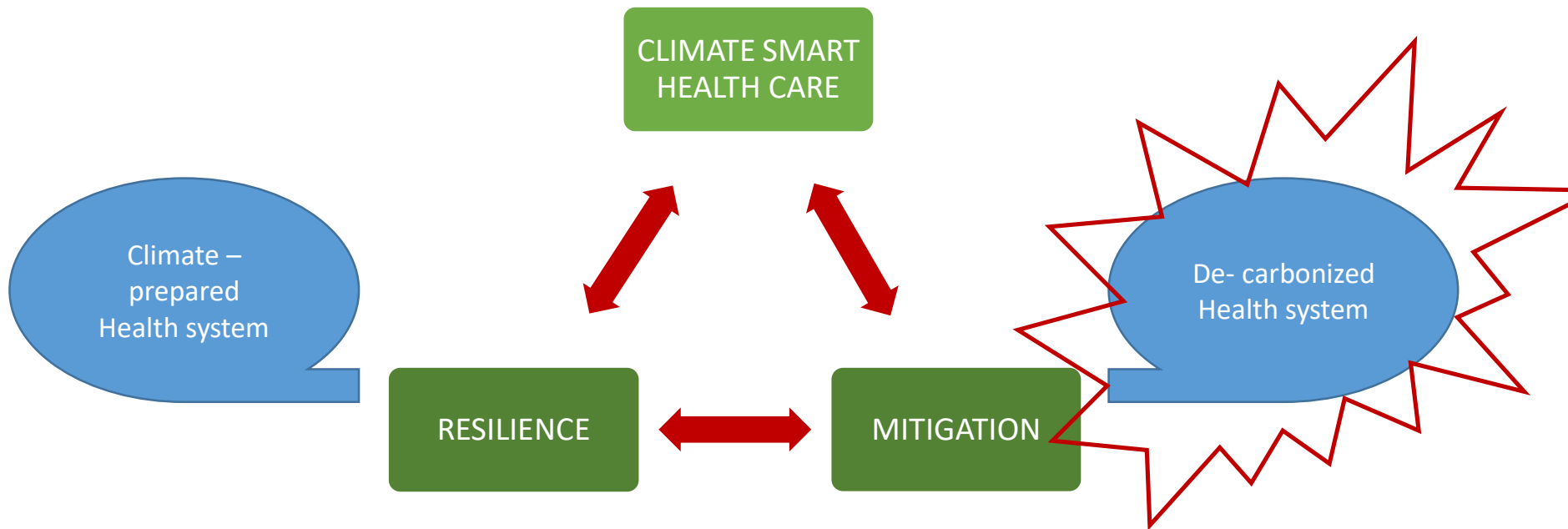
Climate change is an "equalizer"

2015- Align Health Care with the Paris Agreement and Mobilize the Sector as a Climate Leader
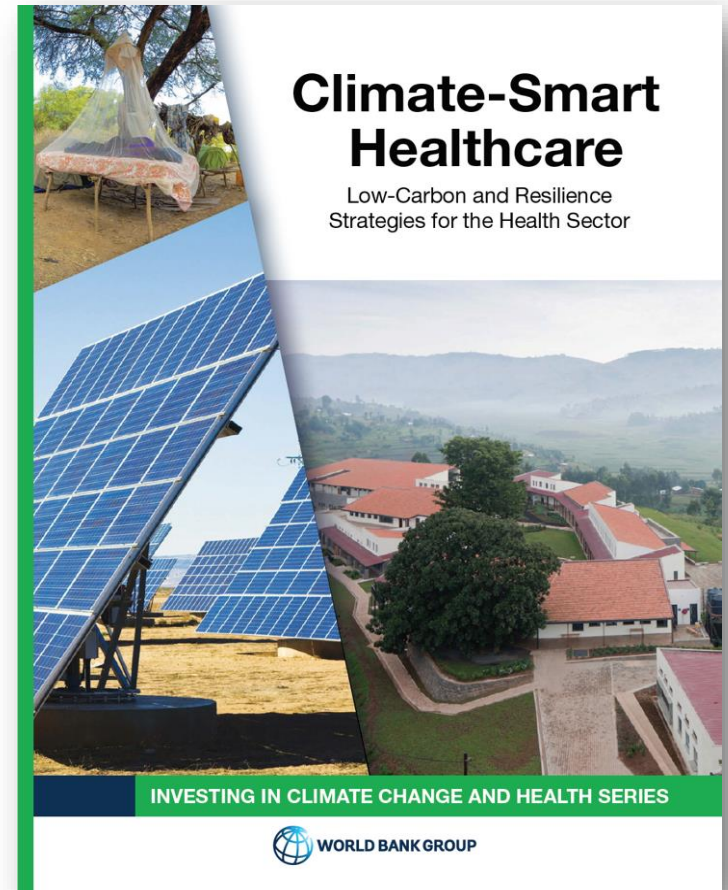
Climate-Smart Healthcare

*Transformative action in two dimensions of healthcare – **adaptation/resilience** and **mitigation (greening)**, together enshrine the principles of a **Climate-Smart health care system***
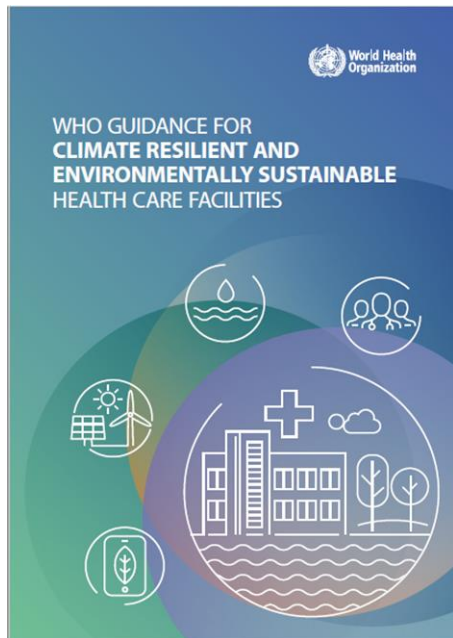
2017- Climate-Smart Health Care 7 *Key Elements*

1.**Overall system design** for coordinated care, emphasis on local providers, and driven by public health needs.

2.**Building design and construction** based on low carbon approaches.

3.Investment in **renewable energy** and **energy efficiency**.

4.Waste minimization and sustainable health care **waste management**.

5.Sustainable **transport** and **water** consumption policies.

6.Low carbon **procurement** policies for pharmaceuticals, medical devices, food and other products.

7.**Resilience** strategies to withstand extreme weather events and anchor sustainable communities

Health Care Without Harm

Climate-Smart Healthcare

Low-Carbon and Resilience Strategies for the Health Sector

INVESTING IN CLIMATE CHANGE AND HEALTH SERIES

WORLD BANK GROUP

2020 Guidance-Four fundamental requirements for providing safe and quality care

WHO GUIDANCE FOR CLIMATE RESILIENT AND ENVIRONMENTALLY SUSTAINABLE HEALTH CARE FACILITIES

HEALTH WORKFORCE:
adequate numbers of skilled human resources with decent working conditions, empowered and informed to respond to these environmental challenges.

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE MANAGEMENT:
sustainable and safe management of water, sanitation and health care waste services.

ENERGY:
sustainable energy services.

INFRASTRUCTURE, TECHNOLOGIES AND PRODUCTS:
appropriate infrastructure, technologies, products and processes, including all the operations that allow for the efficient functioning of the health care facility.

Salient guidelines for implementation of India's National adaptation plan

- Health sector response is central

- Aligning with global frameworks and guidelines while contextualizing for India

- Needs decentralized action at regional and state levels, and each region/state can be unique with its own specific vulnerabilities

- One size fits all – does not work

- An integrated vulnerability risk mapping for climate and health is key first step

India Framework - Dimensions Of Green and Climate Resilient Healthcare

Site selection

Building and infrastructure

Natural resources- air, water, energy, food

Waste management

Sustainable procurement

Transport & Communications Climate Information services

Human resources
Capacity building
Leadership
Climate financing

How do we achieve this in India?

➢**Mapping** of climate vulnerability (CoE) and disease vulnerability through state-level statistics and local patient footfall

➢**Health audit** – personnel, stocks and infrastructure – use of checklists

➢**Energy audit** – lighting, heating, cooling , equipment- use of checklists

➢**Capacity-building** – training workshops, webinars, guidance resources, hand-holding

➢**Communication** -IEC material on air pollution, heat waves, vector-borne diseases, water-borne diseases, post-traumatic stress and nutritional disorders

Implementation for green and resilient health facilities

➢ **Incremental** approach based on baseline vulnerability assessment and health and energy audits

➢ Planning , resource mobilization and implementation

Energy
* **Renewable energy-solar**

* **Energy efficient medical equipment**

* **LED lighting**
* **Cool roofs**

Water
• Rainwater harvesting

• Waste water recycling

• Good water metering

Waste
• Safe and appropriate waste handling and disposal

• Effluent treatment plant

• STPs and ETPs

Considerations for the health and energy audit

Training, Skills & Service Delivery

EFFICIENT APPLIANCES

- Training Modules on usage and maintenance of efficient/Innovative appliances (like Baby Warmer, Breath Counters)

RENEWABLE ENERGY SYSTEM

- Building Technical Capacity in Assessing and Evaluating renewable energy systems.
- Installation services and maintenance of energy systems

BUILT ENVIRONMENTS

- Building Technical Capacity in designing and health points with basics of green construction as guidelines

Acknowledgement : SELCO Foundation

Health Energy Audits

Objectives of a comprehensive audit conducted jointly by health and energy stakeholders for a given health centre or geography

✔ **Energy Efficient Equipment Recommendations**

✔ **Optimised DRE System Needed**

✔ **Inputs on Energy Efficient Building for the Health Centre**

✔ **Requirements of additional appliances to combat specific illnesses for the health centre**

✔ **To recommend missing manpower and skill building requirements**

✔ **To recommend financial or budgetary allocations to run the centre**

Considerations for a Health Energy Audit

TYPE OF CENTRE, COMMUNITY & AREA PROFILE

Sub center, Primary Health Center, CHC, District Hospital; Service Hours; Demographic details of the health centre; Amount of sunlight + seasonal variation of weather or disaster risk typology; Remoteness and access to maintenance services

HEALTH SERVICES & LOCAL ILLNESS

Health services offered and implementation status - clinical and diagnostic service, other community services; Diagnostic services carried out; Number of tests done; List of various local diseases;

HR & BUDGETING

Health centre staff sanctioned and working; Training and capacity building of staff; Arogya Raksha Samiti Financial allocations for the centre

ENERGY & INFRA

Building dimensions and materials, shading, roof type, existing wiring infrastructure(base load/ heating load), earthing quality; Electricity situation, power cuts, existing back ups/ alternate sources, existing loads/ appliances (including pumping and heating requirements) - list capturing appliance type, specs, brand, wattage, duration of use.

OBJECTIVES

Improve Reliability, Quantity and Quality of Services

Availability of reliable power is essential to provide continual and timely services especially surgeries at primary and secondary health centres. Intermittent power supply and extensive use of generators incur huge costs on diesel consumption and procurement.

Optimised solar system designs along with efficient equipment can ensure reliable and increased number of health services.

CASE STUDY
**Sittilingi -
Tribal Health Initiative**

CHALLENGES
High dependency on diesel generators due to lack of reliable grid electricity supply which greatly hampered important operation theatre activities.

SOLUTION
Carrying out of a health energy audit of the health centre to understand critical load requirements and patterns. A solar system was developed as per the OT, Autoclave and Labour Room requirements. This system was provided to the hospital at a 0% interest loan, which was paid back using savings from the initial diesel expenditures.

Amount saved on Diesel Expenditures for Operation Theatre

INR 15,000/per month

70%

Reduction in overall dependence of diesel generators at Primary Health Centres implemented by SELCO Foundation in India.

Efficiency in Building Design

An integrated approach which sets benchmarks for both passive and active lighting and cooling through interventions in:
- Efficiency in Building Design
- Efficiency in Appliances

Impacts:
- Improved well-being for staff as well as in- patients
- Confidence in staff in being able to delivery quality service
- Climate resilience - heat stress, flooding, cyclone
- Reduction in carbon footprint of the health infrastructure

Overall reduction in energy consumption for Lighting- 79%

Overall reduction in energy consumption for Cooling- 85%

Model Subcentres built in partnership with Karuna Trust in Keba, Arunachal Pradesh (A) and YK Mole, Karnataka (B)

Gumballi PHC, Karnataka

PHC created in 1996

Caters to 20,000 indegenous people of BR Hills

Includes an OPD, IPD, eye clinic, dental clinic, laboratory, pharmacy, mental health clinic

Need for solarisation:

- Frequent hour long power cuts
- Long wait times and cancelled appointments due to lack of power
- Expensive diesel backup generator

Solarisation of Gumballi PHC

Intervention

- 3.2 kW solar PV system installed in 2016 by SELCO Foundation; supplementary to power grid
- 1080 Ah lead acid battery bank

Outcomes

- Patients not turned away
- Minimal wait time (saving working hours of daily wage labourers)
- Increase in number of patients treated
- Improvement in confidence of medical staff

Dental Unit in PHC, Gumbhalli running on solar energy

Maternal Labour room in Manipur strengthened with efficient equipment and solar energy

Portable solar powered testing kiosks for COVID-19, set up across Meghalaya

Primary Health Centres in Sambalpur powered by solar energy

Cold chain in Manipur powered by solar energy

Mobile Health services powered by solar energy

Solar powered basic needs in health centres

4 Boat clinics reaching 130,000 people every year

Efficient Labour rooms implemented reaching pregnant women at the last mile

2 Model Health Centres reaching 25,000 people

Mobile health care vans for remote geographies

Solar Powered health Kits – Used for both training and service delivery.

Health centres piloting DRE cold chain solutions

Acknowledgement : SELCO Foundation

Maternity waiting homes implemented- providing safer and comfortable spaces for mothers and their families

Solar powered NCD Kits and Physiotherapy Kits

100 Bed In Patient Department and separate Chemotherapy unit for 50 Patients built in Bihar with Doctors For You. The building is made in partnership with Modulus

30 Bed Out Patient Department for a designated COVID hospital with Doctors For You in Bihar. Solar Energy System for the whole hospital powering appliances like - Examination Light, Oxygen Concentrator, Suction Apparatus, Nebulizer, X-ray viewer, Needle cutter, Refrigerator. The building is made in partnership with Strawcture using Agri Waste Materials.

**Acknowledgement : SELCO Foundation
Doctors for You**

System	Efficient appliances with Green Building Design	In-Efficient appliances with Green Building Design	In-Efficient appliances with standard typical building designs
Total Load Connected	4290 W	5749 W	5749 W
Total Units Required	21.8 Units	30.63 Units	52.34 Units
Solar Panel Capacity	12 kWp	16.2 kWP	26 kWp
% of savings energy	28.82% (solution without energy efficient appliances and with green building design) 58.34% (savings with both- energy efficiency and green building design)		

CASE STUDY: COVID CARE HOSPITAL, VISTEX, Bihar Masarhi

DFY Vistex COVID Care Hospital

"Having solar energy in the hospital is a great support especially during COVID crisis. We have reliable and stable energy access despite of transformers crashing and grid power being cut off. Even during that period we could provide services because of solar."

Dr.Rahul Medical Officer,
VISTEX hospital, DFY

"Because of erratic power supply we were facing difficult to start our medical equipment when it was required. We also had fear in our minds that the equipment may get damaged due to erratic power supply. Now we are able to provide lab services 24X7 in the hospital because of availability of reliable power from solar. There is no need to search for electricity when power goes off. Our staff members are confident and feel secure to run our equipment without any fear.

Ajit Kumar, Lab Technician,
VISTEX hospital, DFY

"We have treated more than 600 COVID-19 patients at the Anekkal COVID care centre. The DRE intervention has been very useful, which helped the hospital in providing uninterrupted power supply to patients. It was crucial especially during summer time."

Mr. Sethuraman, Program Coordinator, DFY

"All state governments are on the verge of bankruptcy and we have to find solutions. We need to show evidence that solutions are cost effective, sustainable and working on ground. I am very sure that then at least a few governments will scale up."

"Because of the reliability of the services here, the word has spread and people are coming in from all across Patna to Masarhi (in the second wave) - so pressure there has been increasing."

Dr Ravikanth, President,
Doctors For You

"Earlier I had to go to Patna which is 90 minutes from my village. It would cost INR 100, occupy my whole day and I would lose wages. With this hospital, it costs INR 20 to reach, doesn't take the whole day and incidental expenses have reduced"

End User, VISTEX hospital, DFY

Deputy Commissioner - East Garo Hills
2 June 2020 · 🌐

Solar setup at our Corona Care Centre was inaugurated today by Honourable Chief Minister Shri Conrad K Sangma. Thank you SELCO Foundation for your continued support for the development of East Garo Hills. #FightAgainstCorona

The state of Meghalaya also witnessed close to 17,000 cases including second wave. In Williamnagar East Garo Hills, a COVID care hospital and Isolation center was established last year. The isolation centre did not have any access to energy earlier, which post solar powering, helped migrant workers rest comfortably in isolation. Close to 180 COVID patients were provided treatment in the COVID care hospital and close to 200 covid suspects were kept in Isolation center
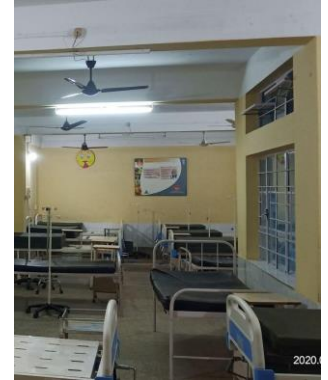
"Close to 200 inmates used this centre during the covid crisis who were migrants returnees from different states. Migrants who stayed in this center felt happy and they expressed that they had a comfortable stay. In the second wave there are very few cases as of now, however, we are prepared for the second wave if there is a need to quarantine people. Such initiatives in this remote setting are useful and it has really helped us during last year COVID pandemic. Now this building is used by Nurses for their stay."

Shri. Conrad K Sangma, Chief Minister, Meghalaya

**Acknowledgement : SELCO Foundation**

Ever since the solar system has been installed, we are able to provide proper medical care. We are not worried about power cuts. This has also helped in reduction in electricity bills and also our diesel consumption has reduced to zero."
-*Mr. Victor, Hospital Administrator, St Joseph's Hospital*

Acknowledgement : SELCO Foundation

St. Joseph's Hospital, Jamshedpur, Jharkhand
St Joseph Hospital was designated as a Covid Care Hospital by the District Administration. This is a 50 bedded hospital catering to a population of 25,000. This hospital faces close to 7 to 8 hours power cut every day. They have a Diesel Generator set on which they were spending almost INR 8,000. Because of frequent power cuts the health workers were struggling with providing proper care for patients.

	Electricity Bill	Diesel Expense
Before	19545	15000
After	14055	0
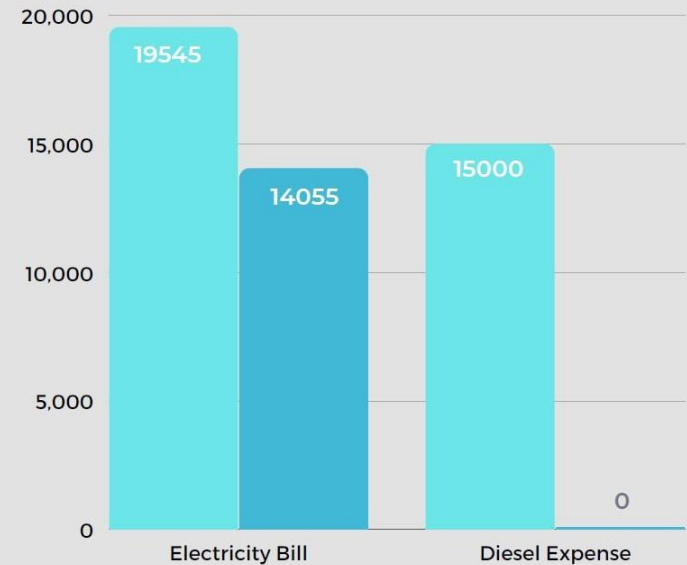
Arogya Raksha Samiti (ARS)
Financing for O&M expenses of Health Centres

The planning, implementation, monitoring, supervision and maintenance of solar energy solutions in the health centres were executed collaboratively by the ARS and health staff, facilitated by Karuna Trust - a health implementation NGO. The ARS contributed in each step of the following process through a participatory approach which inculcated a sense of ownership within its members.

Stage 1:
Establishing rapport and Strengthening of ARS

Stage 2:
Planning and conducting joint Health Energy Audits

Stage 3:
Ownership & Resolution for utilisation of ARS Untied Funds

Stage 4:
Implementation with approvals from ARS

Acknowledgement : SELCO Foundation

ARS Participation at G.H Koppa PHC by Karuna Trust

60 Km away from Dharwad, the Primary Health Centre (PHC) in G.H. Kopa is situated in Dandili Forest Range in Talaghataki Taluk of Karnataka.

SUMMARY

Climate-smart health systems

- a smart strategy for future healthcare and protecting our ecosystems

Inter-sectoral co-ordination is key!

- Integrated vulnerability and risk assessment –thru' checklists for baseline health and energy audits

- Needs-based prioritization of focus areas and resources – RE, water and waste management, transport, buildings , procurement

- Capacity building of all stakeholders

- Planning, finances and implementation using an incremental approach

- Monitoring and evaluation of process indicators and outcome indicators
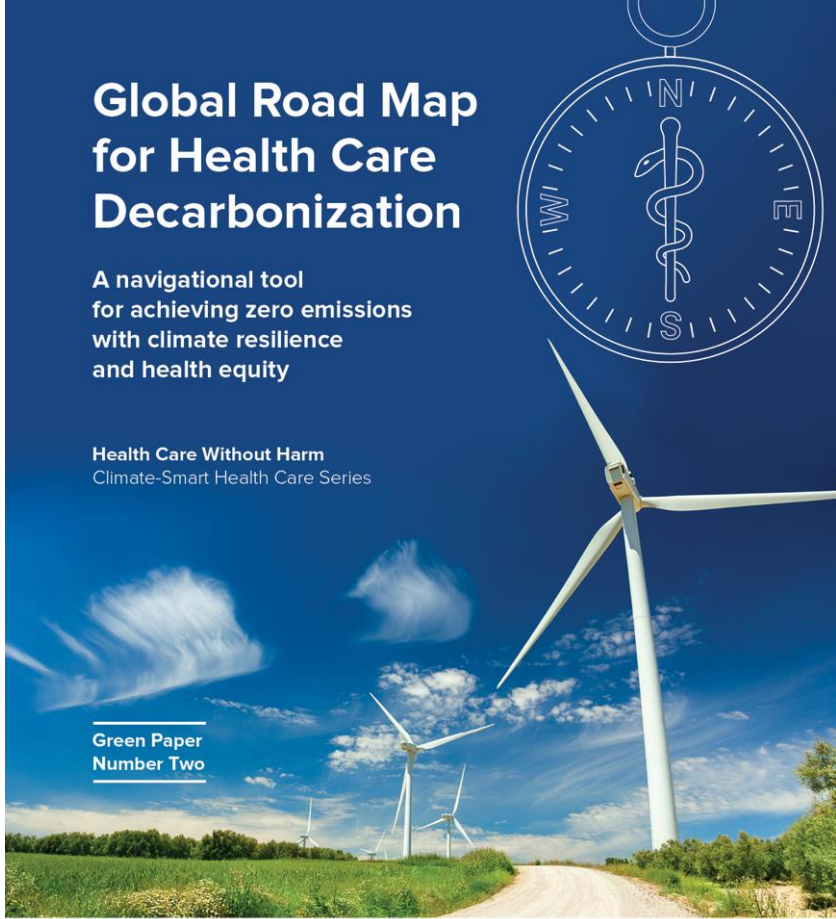
Tool for policy makers

The health sector must:

1. Take on the climate crisis– a greater health threat than COVID-19

2. Achieve decarbonization by transforming the health system.

3. Every nation has a role to play

healthcareclimateaction.org/roadmap

*India Fact Sheet